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EXAMINER

SHARP, JEFFREY ANDREW

ART UNIT PAPER NUMBER

3677

DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/632,443

Applicant(s)

SLESINSKI ET AL.

Examiner

Jeffrey Sharp

Art Unit

3677

NW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/11/2003
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Status of Claims

- [1] Claims 1-19 are pending.

Specification

- [2] The disclosure is objected to because of the following informalities:

Appropriate correction is required.

Drawings

- [3] The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed limitation 'at least one nut extension corresponding to and engaging each nut retaining feature of the nut' in lines 21-22 of claim 1 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. Submitted Figure 3 does not show 'at least one nut extension corresponding to and engaging' top nut retaining feature (30) of nut body (28).

Furthermore, submitted Figure 4 does not show 'each nut retaining feature comprises an outer groove; and each nut tang is received in the outer groove' as stated in Claim 6.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

[4] Claim 2 is objected to because of the following informalities:

Claim 2, line 4, the word -- **thrust** -- should precede the term '*washer*' for clear antecedent basis, as there are two types of washers mentioned in the preceding claim 1: '*lock washer*' and '*thrust washer*'.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

- [5] The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- [6] Claims 16 and 19 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Reid
US-739,716.

Reid teaches:

A lock washer (19) having at least one washer tab (20) suitable for bendable engagement with an adjacent thrust washer (13) outer retaining feature (21), and at least one tang (20) suitable for bendable engagement with an adjacent nut-retaining feature (22). See page 1 lines 75... '*lips or teeth*' is equivalent to '*tangs and tabs*'.

As for claim 19, the lock washer (19) is made from steel (page 1 lines 73-74).

The examiner takes official notice that steel washers are commonly formed by stamping processes.

Art Unit: 3677

[7] Claims 16 and 17 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Cronin et al. US-5,618,143.

Cronin et al. teach:

A lock washer (20) having at least one washer tab (28) suitable for bendable engagement with an adjacent thrust washer (30) outer retaining feature (32), and at least one tang (28, 29) suitable for bendable engagement with an adjacent nut retaining feature (16, splined portion of 12).

[8] Claim 16 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Loe US-1,543,282.

Loe teaches:

A lock washer (17) having at least one washer tab (22) suitable for bendable engagement with an adjacent thrust washer (7) outer retaining feature (8), and at least one tang (19) suitable for bendable engagement with an adjacent nut-retaining feature (side of nut 20).

[9] Claims 16 and 19 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Hart US-706,409.

Hart teaches:

Art Unit: 3677

A lock washer (A) having at least one washer tab (B) suitable for bendable engagement with an adjacent thrust washer outer retaining feature, and at least one tang (D) suitable for bendable engagement with an adjacent nut retaining feature (Page 1 lines 82-86).

As for claim 19, the lock washer (A) is made of steel (Page 1 lines 45-46).

The examiner takes official notice that steel washers are commonly formed by stamping processes.

[10] Claims 16 and 19 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Cronin II et al. US-5,772,373.

Cronin et al. teach (refer to Figure 10):

A lock washer (20) having at least one washer tab (22) suitable for bendable engagement with an adjacent thrust washer outer retaining feature, and at least one tang (26) suitable for bendable engagement with an adjacent nut-retaining feature (splined portion of 12).

As for claim 19, spring steel is considered a '*spring like metal or other suitable material*' (Col. 3 line 46).

The examiner takes official notice that steel washers are commonly formed by stamping processes.

[11] Claims 16, and 18 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Giovannini US-1,731,337.

Art Unit: 3677

Giovannini teaches:

A lock washer (7) having:

at least one washer tab comprising a plurality of equally-spaced, outer washer tabs (9) suitable for bendable engagement with an adjacent thrust washer (2) outer retaining feature (4,5), and

at least one tang (11) comprising inner opposing nut tangs (11) suitable for bendable engagement with an adjacent nut retaining feature (side of nut 20).

[12]. Claim 16 rejected under 35 U.S.C. 102(b) as being clearly anticipated by Applicant's own admission (instant specification, paragraph [0002], lines 1-4).

The applicant states that lock washers known in the art are expected to have tangs and/or tabs to restrict the rotation of nuts. The applicant does not negate the possibility that conventional lock washers, when used in a similar manner would provide any less of an advantage. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Claim Rejections - 35 USC § 103

Art Unit: 3677

[13] The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

[14] Claims 1-3, 9-11, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ball US-130,689 in view of Champion US-641,191 and in further view of Reid US-739,716.

Ball teaches:

A combination lock washer and spindle bearing assembly, comprising: a spindle (A) having: a spindle shoulder (a); and a spindle end extending outward from the spindle shoulder with an uninterrupted thread configuration (d); thrust washer (c) disposed about the spindle shoulder and having at least one outer retaining feature (flats on periphery); a nut (e) disposed about the uninterrupted thread configuration, having: a nut body with at least one nut retaining feature (flats on periphery); and lock washer (m) disposed about the inner circumferential shoulder having: at least one washer extension corresponding to and engaging each outer retaining feature of the thrust washer, and at least one nut extension corresponding to and engaging each nut retaining feature of the nut; and wherein the thrust washer, lock washer, and nut may be at any angle relative to one another allowing for infinite adjustment positions and the lock washer prevents relative rotation between the spindle, thrust washer, lock washer, and nut.

Ball does not disclose expressly: an inner circumferential shoulder extending from the nut body in direct contact with the thrust washer forming a pocket between the thrust washer and nut

Art Unit: 3677

body, the lock washer retained within the pocket between the thrust washer and nut body, and said lock washer having at least one washer extension in the form of tabs. However, Ball does not teach away from using a lock washer having tab-like extensions, as the reference states that the 'washer may be made in circular form' (Col. 2 lines 6-7), and has bendable 'projections n n' (Col. 2 line 11). Ball does not teach away from a lock washer being rotateably held in a pocket, as the lock washer only needs to be 'placed between the collar and nut' (Col 2 lines 7-8).

Champion teaches a nut (7) having an inner circumferential shoulder (7c) extending from the nut body in direct contact with an adjacent abutment surface (E), in order to provide a pocket for a ring-like member (5) to rotate within, even after the nut is tight against said abutment surface. In the instant case, abutment surface would be the thrust washer.

Reid teaches a lock washer (19) having improved washer extensions (20) in greater number, used for the same purpose of bending to engage the outer retaining features (peripheral portions) of adjacent fastening members.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the assembly taught by Ball, to include the shoulder taught by Champion and the improved washer extensions taught by Reid, in order to 1) provide a pocket between the thrust washer (c) and nut body (e) for the lock washer (m) to be held rotateably within, 2) to allow an infinite number of relative adjustment positions between the thrust washer, lock washer, and nut after tightening of the nut, and 3) to better align the washer extensions with corresponding retaining features without over-torquing or under-torquing the nut.

As for claim 2, washer extensions (20) taught by Reid can be considered tangs or tabs, as applicant has not defined a difference between the two. Further, tangs and tabs perform much in

Art Unit: 3677

the same manner. Reid shows at least one washer extension (20) comprising at least one washer tang (20) corresponding to and engaging each outer retaining feature of the thrust washer, and at least one nut extension (20) comprising at least one nut tab (20) corresponding to and engaging each nut retaining feature.

As for claim 3, the sub-assembly is inherent from Ball's disclosure. The apparatus could be assembled in any order and still maintain identical structure and function.

As for claim 9, thrust washer (c) taught by Ball has an outer retaining feature comprising a flat outer edge.

As for claim 10, spindle shoulder (a) taught by Ball comprises at least one spindle retaining feature (flats on periphery), and the thrust washer (c) taught by Ball has at least one inner retaining feature corresponding to and mating to said at least one spindle retaining feature, in order to prevent washer rotation relative to the spindle.

As for claim 11, both spindle retaining features and inner retaining features are flat.

As for claim 15, tabs engage outer retaining features, and the tangs engage nut retaining features, thereby preventing relative movement between the thrust washer, lock washer, and nut.

[15] Claims 1, 9-11, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ball US-130,689 in view Wing et al. US-3,851,690 and in further view of Reid US-739,716.

Ball teaches:

A combination lock washer and spindle bearing assembly, comprising: a spindle (A) having: a spindle shoulder (a); and a spindle end extending outward from the spindle

Art Unit: 3677

shoulder with an uninterrupted thread configuration (d); thrust washer (c) disposed about the spindle shoulder and having at least one outer retaining feature (flats on periphery); a nut (e) disposed about the uninterrupted thread configuration, having: a nut body with at least one nut retaining feature (flats on periphery); and lock washer (m) disposed about the inner circumferential shoulder having: at least one washer extension corresponding to and engaging each outer retaining feature of the thrust washer, and at least one nut extension corresponding to and engaging each nut retaining feature of the nut; and wherein the thrust washer, lock washer, and nut may be at any angle relative to one another allowing for infinite adjustment positions and the lock washer prevents relative rotation between the spindle, thrust washer, lock washer, and nut.

Ball does not disclose expressly: an inner circumferential shoulder extending from the nut body in direct contact with the thrust washer forming a pocket between the thrust washer and nut body, the lock washer retained within the pocket between the thrust washer and nut body, and said lock washer having at least one washer extension in the form of tabs. However, Ball does not teach away from using a lock washer having tab-like extensions, as the reference states that the 'washer may be made in circular form' (Col. 2 lines 6-7), and has bendable 'projections n n' (Col. 2 line 11). Ball does not teach away from a lock washer being rotateably held in a pocket, as the lock washer only needs to be 'placed between the collar and nut' (Col 2 lines 7-8).

Wing et al. teaches a nut (45) having an inner circumferential shoulder (48) extending from the nut body in direct contact with an adjacent thrust washer (15), in order to provide a pocket for an annular ring member (alternative anti-rotation means 29) to rotate within, even after the nut is tight against the thrust washer. The nut is used in a similar spindle bearing

Art Unit: 3677

assembly (having a thrust washer being held non-rotatable on the shaft), and could be used on bolts and studs such as that taught by Ball (Col. 2 lines 60-64).

Reid teaches a lock washer (19) having improved washer extensions (20) in greater number, used for the same purpose of bending to engage the outer retaining features (peripheral portions) of adjacent fastening members.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the assembly taught by Ball, to include the shoulder taught by Wing et al. and the improved washer extensions taught by Reid, in order to 1) provide a pocket between the thrust washer and nut body for the lock washer to be held rotateably within, 2) to allow an infinite number of relative adjustment positions between the thrust washer, lock washer, and nut after tightening of the nut, and 3) to better align the washer extensions with corresponding retaining features without over-torquing or under-torquing the nut.

As for claim 9, thrust washer (c) taught by Ball has an outer retaining feature comprising a flat outer edge.

As for claim 10, spindle shoulder (a) taught by Ball comprises at least one spindle retaining feature (flats on periphery), and the thrust washer (c) taught by Ball has at least one inner retaining feature corresponding to and mating to said at least one spindle retaining feature, in order to prevent washer rotation relative to the spindle.

As for claim 11, both spindle retaining features and inner retaining features are flat.

As for claim 15, tabs engage outer retaining features, and the tangs engage nut retaining features, thereby preventing relative movement between the thrust washer, lock washer, and nut.

Art Unit: 3677

[16] Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al. and Reid as stated above, in even further view of Carns US-1,685,120.

B v. W & R teaches all of the limitations of the instant claim 1; however, fails to disclose expressly at least one washer extension comprising at least one washer tang corresponding to and engaging each outer retaining feature of the thrust washer, and at least one nut extension comprising at least one nut tab corresponding to and engaging each nut retaining feature.

Carns teaches at least one washer extension comprising at least one washer tang (21) corresponding to and engaging each outer retaining feature of the thrust washer (16), and at least one nut extension comprising at least one nut tab (22) corresponding to and engaging each nut retaining feature (18). Carns also teaches the tangs (21) to be of preferable larger size and diametrically opposed as shown in Applicant's drawings to possibly help with distributing forces.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the lock washer taught by B v. W & R to include the large washer engaging tangs and nut engaging tabs taught by Carns, in order to provide better means for frictionally securing the nut and washer from relative rotation. Carns does not teach away from equally-spaced tabs; however, suggests that the tabs be irregularly spaced to ensure that 'some of them are surer to register with the flat faces of the nut' (Col 2 lines 86-89). See also, cited reference US-3,307,893 to Williams, which shows that it is obvious to add tabs so that at least one corresponds to each retaining feature.

[17] Claim 2 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al. and Reid as stated above, in even further view of Giovannini US-1,731,337.

B v. W & R teaches all of the limitations of the instant claim 1; however, fails to disclose expressly at least one washer extension comprising at least one washer tang corresponding to and engaging each outer retaining feature of the thrust washer, and at least one nut extension comprising at least one nut tab corresponding to and engaging each nut retaining feature.

Giovannini teaches at least one washer extension comprising at least one washer tang (9) corresponding to and engaging each outer retaining feature of the thrust washer (4), and at least one nut extension comprising at least one nut tab (11) corresponding to and engaging each nut retaining feature. Giovanni also teaches the tangs (9) to be diametrically opposed as shown in Applicant's drawings to possibly help with distributing forces.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the lock washer taught by B v. W & R to include the large washer engaging tangs and nut engaging tabs taught by Giovannini, in order to provide better means for frictionally securing the nut and washer from relative rotation.

[18] Claim 3 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al. and Reid as stated above, in even further view of Hein US-3,447,342.

B v. W & R teaches all of the limitations of the instant claim 1, and Ball shows a lock washer and thrust washer that are engaged as a subassembly; however, B v. W & R fails to disclose expressly the lock washer and thrust washer engaged and acting as one component prior to engaging the tabs with the nut retaining feature.

Hein teaches a solid combination thrust washer portion (28) and lock washer (15) that would act in the same manner as a sub-assembled thrust washer and lock washer disclosed by

Art Unit: 3677

Applicant. The subassembly taught by Hein is prevented from rotation on spindle (11) by a spindle-retaining feature (9) and mating surfaces (27), and tabs (30) are bent into engagement with the nut in a single bending process. The tabs of lock washer portion (15) of are evenly spaced, and are an alternative to a solid outer peripheral portion as disclosed by lock washer element (m) of Ball US-130,689 (Col. 2 lines 27-31).

At the time of invention, it would have been obvious to one of ordinary skill in the art, to combine in sub-assembly, the thrust washer and lock washer taught by B v. W & R, as shown by Hein, in order to 1) achieve the benefits of eliminating a loose part during assembly, and 2) simplify and expedite the installation and locking process by only requiring one locking/bending step upon final assembly (i.e., engaging the nut with peripheral tabs).

[19] Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al. and Reid as stated above, in even further view of Cronin II et al. US-5,772,373 (referring to Figure 10 and bridging Col 5 line 49 - Col 6 line13).

B v. W & R teaches all of the limitations of the instant claim 1; however, fails to disclose expressly that at least one washer extension comprises at least one washer tab corresponding to and bent into engagement with each outer retaining feature, and the at least one nut extension comprises at least one nut tang corresponding to and snapping into engagement with each nut retaining feature.

Cronin II et al. teaches at least one washer extension that comprises at least one washer tab (22c) corresponding to and bent into engagement with each outer retaining feature (36b), and

Art Unit: 3677

the at least one nut extension comprises at least one nut tang (26c) corresponding to and snapping into engagement with each nut retaining feature (splined portion of 12).

At the time of invention, it would have been obvious to one of ordinary skill in the art, to modify the assembly taught by B v. W & R to comprise at least one washer tab and nut tang, having the at least one washer tab corresponding to each outer retaining feature, and the at least one nut extension corresponding to each nut retaining feature, in order to provide better means for frictionally securing the nut and washer from relative rotation.

As for claim 5, Ball teaches at least one additional washer tab (n) suitable to engage portions of the thrust washer (c) adjacent the washer retaining feature (flat on periphery).

[20] Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al., Reid, and Cronin II et al. as stated above, in even further view of Ullman 906,475.

B v. W, R & C teaches all of the limitations of the instant claim 4, including the tangs being received by the nut retaining features; however, fails to disclose expressly that the at least one nut retaining feature is an outer nut retaining feature that comprises an outer groove;

Ullman teaches at least one outer nut retaining feature (16) that comprises an outer groove (17), and receives at least one tang (22, 23).

At the time of invention, it would have been obvious to one of ordinary skill in the art, to modify the nut retaining features taught by B v. W, R & C to be outer nut retaining features comprising grooves fit to receive nut tangs as taught by Ullman, so as to 1) increase the surface contact area of the tang with the nut, thus increase frictional resistance against rotational loads

Art Unit: 3677

and/or vibration, and 2) provide a low profile with respect to a planar face of the nut for safety, function, or aesthetics.

[21] Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al., Reid, and Cronin II et al. as stated above, in even further view of Olson 2,128,429.

B v. W, R & C teaches all of the limitations of the instant claim 4, including nut tangs corresponding to nut retaining features; however, fails to disclose expressly that the nut tangs and nut retaining features are configured to fit within a standard installation socket when engaged with each other.

Olson teaches each nut retaining feature and nut tang configured to fit within a standard installation socket with the nut tang engaged within the nut retaining feature (see profile in Figure 3), in order to leave exposed outer gripping surfaces of the nut (Col 1 lines 27-34).

At the time of invention, it would have been obvious to one of ordinary skill in the art, to modify the nut retaining features of the nut taught by B v. W, R & C, to comprise a low profile configuration similar to that taught by Olson, in order to provide a flush outer periphery such that: 1) a conventional socket could be placed over the nut without interference, even after the tangs are engaged, 2) the nut and lock washer could be joined as a subassembly prior to positioning on spindle using a tool, 3) for aesthetic streamlining purposes (Col 3 lines 29-31), or 4) to possibly allow for a conventional protective cap to be placed thereon.

As for claim 8, the lock washer and nut are sufficiently engaged to be provided as a sub-assembly (Col 3 lines 20-25).

[22] Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Champion, and Reid as stated above, and in even further view of Harker US-433,730.

B v. C & R teaches: a thrust washer having inner retaining features corresponding to and engaging an outer spindle retaining features; however, does not disclose expressly, the thrust washer inner retaining feature to be a keyway shape and the spindle retaining feature to be a shape corresponding to and mating with the keyway shape of the thrust washer.

Harker teaches a thrust washer used in a similar application, having a keyway shape (f) and the spindle retaining feature (g) is a shape corresponding to and mating with the keyway shape of the thrust washer. The thread shown on the spindle is shown uninterrupted similar to the spindle (A) taught by Ball.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the inner and outer retaining features of the thrust washer and spindle shoulder taught by Ball, to comprise the well-known keyway shapes as taught by Harker, in order to provide 1) increased frictional surface area contact, and 2) better means for sustaining a torque load, thus holding the thrust washer anti-rotational with respect to the spindle.

[23] Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Champion, and Reid as stated above, and in even further view of Karis US-5,022,875.

B v. C & R teaches: a thrust washer having inner retaining features corresponding to and engaging an outer spindle retaining features; however, does not disclose expressly, the thrust washer inner retaining feature to be a longitudinal spline shape and the spindle retaining feature

Art Unit: 3677

to be a shape corresponding to and mating with said longitudinal spline shape of the thrust washer.

Karis teaches a thrust washer (30) having outer retaining features (40) and used in a similar application, having an inner longitudinal splined retaining feature. The spindle retaining feature (24) is a longitudinal spline shape corresponding to and mating with the thrust washer. The thread (26) shown on the spindle (22) is shown uninterrupted similar to the spindle (A) taught by Ball.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the inner and outer retaining features of the thrust washer and spindle shoulder taught by Ball, to comprise the well-known spline shapes as taught by Karis, in order to provide 1) increased frictional surface area contact, and 2) better means for sustaining a torque load, thus holding the thrust washer anti-rotational with respect to the spindle.

[24] Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al., and Reid as stated above, and in even further view of Harker US-433,730.

B v. W & R teaches: a thrust washer having inner retaining features corresponding to and engaging an outer spindle retaining features; however, does not disclose expressly, the thrust washer inner retaining feature to be a keyway shape and the spindle retaining feature to be a shape corresponding to and mating with the keyway shape of the thrust washer.

Harker teaches a thrust washer used in a similar application, having a keyway shape (f) and the spindle retaining feature (g) is a shape corresponding to and mating with the keyway

Art Unit: 3677

shape of the thrust washer. The thread shown on the spindle is shown uninterrupted similar to the spindle (A) taught by Ball.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the inner and outer retaining features of the thrust washer and spindle shoulder taught by Ball, to comprise the well-known keyway shapes as taught by Harker, in order to provide 1) increased frictional surface area contact, and 2) better means for sustaining a torque load, thus holding the thrust washer anti-rotational with respect to the spindle.

[25] Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al., and Reid as stated above, and in even further view of Karis US-5,022,875.

B v. W & R teaches: a thrust washer having inner retaining features corresponding to and engaging an outer spindle retaining features; however, does not disclose expressly, the thrust washer inner retaining feature to be a longitudinal spline shape and the spindle retaining feature to be a shape corresponding to and mating with said longitudinal spline shape of the thrust washer.

Karis teaches a thrust washer (30) having outer retaining features (40) and used in a similar application, having an inner longitudinal splined retaining feature. The spindle retaining feature (24) is a longitudinal spline shape corresponding to and mating with the thrust washer. The thread (26) shown on the spindle (22) is shown uninterrupted similar to the spindle (A) taught by Ball.

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify the inner and outer retaining features of the thrust washer and spindle shoulder taught by

Art Unit: 3677

Ball, to comprise the well-known spline shapes as taught by Karis, in order to provide 1) increased frictional surface area contact, and 2) better means for sustaining a torque load, thus holding the thrust washer anti-rotational with respect to the spindle.

[26] Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Wing et al., and Reid as stated above, in even further view of Olson 2,128,429.

B v. W & R teaches all of the limitations of the instant claim 1, including a spindle shoulder (a) having a spindle retaining feature comprising a flat spindle surface; the thrust washer (c) retaining feature comprising a flat outer edge, and a flat inner edge engaging the flat spindle surface; and the washer extension comprising a tab (n) engaging the thrust washer, and the nut extension comprising a tang (n) engaging the nut body.

B v. W & R does not disclose expressly the nut retaining features to comprise an outer groove that receives the tang engaging the nut body;

Olson teaches each nut retaining feature to have an outer groove that receives a nut tang (see profile in Figure 3), in order to leave exposed outer gripping surfaces of the nut (Col 1 lines 27-34).

At the time of invention, it would have been obvious to one of ordinary skill in the art, to modify the nut retaining features of the nut taught by B v. W & R, to comprise outer grooves similar to that taught by Olson, in order to provide a flush outer periphery such that: 1) a conventional socket could be placed over the nut without interference, even after the tangs are engaged, 2) the nut and lock washer could be joined as a subassembly prior to positioning on

Art Unit: 3677

spindle using a tool, 3) for aesthetic streamlining purposes (Col 3 lines 29-31), or 4) to possibly allow for a conventional protective cap to be placed thereon.

[27] Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v.

Champion, and Reid as stated above, in even further view of Olson 2,128,429.

B v. C & R teaches all of the limitations of the instant claim 1, including a spindle shoulder (a) having a spindle retaining feature comprising a flat spindle surface; the thrust washer (c) retaining feature comprising a flat outer edge, and a flat inner edge engaging the flat spindle surface; and the washer extension comprising a tab (n) engaging the thrust washer, and the nut extension comprising a tang (n) engaging the nut body.

B v. C & R does not disclose expressly the nut retaining features to comprise an outer groove that receives the tang engaging the nut body;

Olson teaches each nut retaining feature to have an outer groove that receives a nut tang (see profile in Figure 3), in order to leave exposed outer gripping surfaces of the nut (Col 1 lines 27-34).

At the time of invention, it would have been obvious to one of ordinary skill in the art, to modify the nut retaining features of the nut taught by B v. C & R, to comprise outer grooves similar to that taught by Olson, in order to provide a flush outer periphery such that: 1) a conventional socket could be placed over the nut without interference, even after the tangs are engaged, and 2) the nut and lock washer could be joined as a subassembly prior to positioning on spindle using a tool, 3) for aesthetic streamlining purposes (Col 3 lines 29-31), or 4) to possibly allow for a conventional protective cap to be placed thereon.

[28] Claim 15 is also rejected under 35 U.S.C. 103(a) as being unpatentable over Ball v. Champion, and Reid as stated above, in even further view of Herold 2,155,827.

B v. C & R teach all the limitations of claim 15: A combination thrust washer, lock washer and nut assembly, comprising: a thrust washer having at least one outer retaining feature; a nut disposed adjacent the thrust washer, having: a nut body with at least one nut retaining feature; and an inner circumferential shoulder extending from the nut body in direct contact with the thrust washer forming a pocket between the thrust washer and nut body; and a lock washer disposed about the inner circumferential shoulder and retained within the pocket between the thrust washer and nut body, and having: at least one washer tab corresponding to and engaging each outer retaining feature, and at least one nut tang corresponding to and engaging each nut retaining feature; and wherein the lock washer is suitable for preventing relative movement between the thrust washer, lock washer, and nut.

However, B v. C & R do not disclose expressly the tangs and tabs to be of different proportions and/or size.

Herold teaches tangs (35) which are diametrically opposed as shown in the drawings submitted by Applicant, and are of different size than tabs (33) which are bent to contact the two outer retaining features (32) of the thrust washer (30). The tangs (35) engage the nut retaining features, and thus the lock washer (34) is suitable for preventing relative movement between the thrust washer, lock washer, and nut.

At the time of invention, it would have been obvious to one of ordinary skill in the art, to modify the tangs and tabs nut taught by B v. C & R to have different sizes corresponding to the

Art Unit: 3677

various shapes, sizes, and depths of thrust washers and nuts, to allow for optimum engagement, and to possibly to allow the tabs or tangs to serve other functions in addition to holding the thrust washer, lock washer, and nut in a relative non-rotatable subassembly.

Conclusion

[29] The prior art made of record and not relied upon is considered pertinent to applicant's disclosure is as follows:

US-3,307,893 Williams teaches more than one tab or tang engaging each nut retaining feature in a spindle bearing assembly, discloses thin and easily bent tabs, and discloses that it is would have been obvious to add or subtract the number of tabs at the time of invention (Col. 3 lines 2-4).

US-1,015,763 Ploncard teaches a nut having a shoulder to allow for clearance and rotation within locking member (e). The shoulder makes direct contact with non-rotateable thrust washer element (c).

US-3,294,141 Schotthoefer et al. teaches a similar spindle bearing assembly having an interrupted thread configuration.

US-706,409 Hart teaches a similar lock washer having tangs (B) that could engage thrust washer retaining features, and tabs (D) that could engage nut retaining features.

US-1,966,015 Kuzovenkoff teaches an array of design possibilities for lock washers.

Art Unit: 3677

US-955,577 Bradshaw teaches a similar lock washer that could be used in a similar manner.

US-1,372,178 Loving teaches a nut and lock washer subassembly to be used on an uninterrupted thread.

US-474,315 Duer shows a lock washer (10) having inner tangs (11) and outer tabs (13) that could be used in a similar application.

US-5,221,168 Kasai teaches a bearing spindle assembly of the prior art.

US-5,967,723 Duran shows a lock washer having tabs and flat inner edges engaging a flat on a shaft.

US-4,505,628 Meibuhr shows a bearing spindle assembly of the prior art.

US-4,812,094 Grube teaches a bearing spindle assembly of the prior art.

US Patent Pub 2003/0035699 shows a nut having a shoulder and one or more nut retaining features, which mates with a locking member.

US-2,887,891 Perez shows a bearing spindle assembly of the prior art.

US-6,095,735 Weinstien et al. shows a bearing spindle assembly of the prior art.

US-1,320,962 Andrix teaches diametrically opposed tangs used in spindle bearing assemblies.

US-5,938,173 Hayakawa teaches a lock washer having more than one tang per nut retaining feature, and flat inner edges engaging a flat on a shaft.

US-5,674,034 Bennett shows a bearing spindle assembly of the prior art.

US-4,737,058 Callman et al. shows a bearing spindle assembly of the prior art.

US-4,326,816 Morisawa teaches a spindle lock assembly of the prior art.

Art Unit: 3677

[30] Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey Sharp whose telephone number is (703) 305-2693. The examiner can normally be reached on 7:30 am - 5:00 pm Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J.J. Swann can be reached on (703) 306-4115. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JAS


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PRIMARY EXAMINER